

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SHANE P. LEIPHART

Appeal 2006-2353
Application 09/785,858
Technology Center 1700

Decided: May 30, 2007

Before BRADLEY R. GARRIS, CATHERINE Q. TIMM, and
LINDA M. GAUDETTE, *Administrative Patent Judges*.

GARRIS, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal involves claims 35-39, 41-48, and 75, the only claims pending in this application. We have jurisdiction over the appeal pursuant to 35 U.S.C. §§ 6 and 134.

We AFFIRM.

INTRODUCTION

Appellant invented a method of forming an aluminum comprising line having a titanium nitride layer thereon by using physical vapor deposition (PVD) (claim 35, Specification 3, ll. 18-20). The method includes physically vapor depositing a first layer of aluminum or aluminum alloy over an insulating layer on a substrate such that the outermost portion of the aluminum or aluminum alloy is deposited at a temperature of at least 400°C (claim 35). The insulating layer has a hole that is filled by the aluminum or aluminum alloy (claim 35). The outermost portion of the aluminum or aluminum alloy is maintained at a temperature of at least 360°C between the depositing of the aluminum or aluminum alloy layer and the depositing of the titanium on the first layer (claim 35). A titanium layer is deposited atop the aluminum or aluminum alloy layer while the outer portion is at a temperature of at least 360°C (claim 35). The titanium layer and the aluminum layer react to form a titanium-aluminum alloy layer (claim 35, Specification 9, ll. 1-6). A titanium nitride layer is coated atop the titanium-aluminum alloy and photopatterning the layered structure to form the aluminum comprising line (claim 35).

Claim 35 is illustrative:

35. A method of forming an aluminum comprising line having a titanium nitride comprising layer thereon, the method comprising:

providing a substrate having an opening extending through an insulating layer to a diffusion region;

in a processing tool, physical vapor depositing a first layer comprising at least one of elemental aluminum or an aluminum alloy over the substrate in a first chamber, the first layer being formed over the insulating layer and filling the opening, at least an outermost portion of the first layer being deposited at a first deposition temperature of at least 400°C;

physical vapor depositing a titanium alloy on the first layer in a second chamber of the processing tool while at least an outer portion of the first layer is at a temperature of at least about 360°C, and forming therefrom a second layer comprising an alloy of titanium and the aluminum from the first layer in the second chamber during said depositing, the alloy having a higher melting point than that of the first layer, and wherein essentially all the physical vapor deposited titanium alloys with the aluminum of the first layer during the depositing, the outermost portion of the first layer sustaining a temperature of at least 360°C between the depositing the first layer and the depositing the titanium alloy on the first layer;

physical vapor depositing a third layer comprising titanium nitride on the second layer;

removing the substrate from the processing tool after depositing the third layer; and

photopatterning the first, second and third layers into a conductive line over a contacting plug within the opening and in electrical connection with the diffusion region.

The Examiner relies on the following prior art references as evidence of unpatentability:

Besser	US 5,582,881	Dec. 10, 1996
Marieb	US 5,909,635	Jun. 1, 1999
Colgan	US 5,925,933	Jul. 20, 1999
Shan	US 6,140,228	Oct. 31, 2000

The rejection as presented by the Examiner is as follows:

1. Claims 35-39, 41-48, and 75 are rejected under 35 U.S.C. § 103(a) as unpatentable over Besser in view of Shan, Marieb and Colgan.¹

¹ Appellant's listing of the "Grounds of Rejection to be Reviewed on Appeal" omits claims 46-48 from the § 103(a) rejection over Besser in view of Shan, Marieb and Colgan. However, since Appellant indicates that claims 35-39, 41-48, and 75 are "the basis for the present appeal" (Br. 3), and Appellant references claims 41-48 as dependent claims in the

Rather than reiterate the respective positions advocated by the Appellant and by the Examiner concerning these rejections, we refer to the Brief, and to the Answer respectively for a complete exposition thereof.

OPINION

Appellant argues at pages 8 to 13 of the Brief the following five features of claim 35 with respect to Besser, Shan, Colgan, or Marieb: (1) “providing a substrate having an opening extending through an insulating layer to a diffusion region,” (claim 35) (2) an “aluminum or an aluminum alloy . . . filling the opening [in the insulating layer],” (claim 35) (3) “at least an outermost portion of the first layer [i.e., the aluminum or aluminum alloy layer] being deposited at a first deposition temperature of at least 400°C,” (claim 35) (4) “the outermost portion of the first layer [i.e., the aluminum or aluminum alloy] sustaining a temperature of at least 360°C between the depositing of the first layer and the depositing of the titanium alloy on the first layer,” (claim 35) and (5) “photopatterning the first, second and third layers into a conductive line” (claim 35) (Br. 8-13).

We have considered all of Appellant’s arguments and are unpersuaded by them for the reasons below.

In view of the Examiner’s thorough explanation of the reasoning “why, as a whole, the prior art [of the § 103] rejection would [have] reasonably . . . [led] one ordinary skill in the art to arrive at the claimed invention” (Answer 18-24), which addresses and successfully rebuts each of

“Argument” section of the Brief (Br. 8 and 13), it is apparent that Appellant recognizes claims 41-48 are included in the rejection on appeal.

Appellant's arguments directed to the claim features noted above, we adopt the Examiner's reasoning as our own. We add the following discussion to address an additional issue raised by Appellant's arguments.

Appellant improperly attacks each of the references individually, instead of addressing the Examiner's rejection based upon the combination of references. Evidence that Appellant has improperly attacked the references individually is found in Appellant's arguments that a particular reference fails to disclose a claim feature which is different than the claim feature the Examiner relied on the reference to show. An applicant cannot show non-obviousness by attacking references individually where, as here, the rejections are based on a combination of references. *In re Keller*, 642 F.2d 413, 426, 208 USPQ 871, 882 (CCPA 1981).

For example, Appellant indicates that the Examiner relies on Colgan as "suggesting photopatterning of layers" (Br. 9). However, instead of properly arguing the combination of Colgan's photopatterning with the method of forming an aluminum line of Besser in view of Shan and Marieb, Appellant improperly attacks the Colgan patent individually and argues that Colgan does not suggest "formation of a first layer comprising aluminum over an insulating layer and filling an opening which extends through the insulating layer" (i.e., Appellant argues claim features (1) and (2) instead of claim feature (5), which the Examiner relied on Colgan to disclose as part of the combination) (Br. 9).

From the foregoing, Appellant has not successfully carried his burden of rebutting the Examiner's prima facie case. *In re Kumar*, 418 F.3d 1361, 1366, 76 USPQ2d 1048, 1051 (Fed. Cir. 2005) (*explaining*, once the Examiner has established a prima facie case, the burden falls on Appellant to

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rebut the prima facie case). Accordingly, we affirm the Examiner's § 103(a) rejection of argued claim 35 and non-argued claims 36-39, 41-48, and 75.

DECISION

We sustain the § 103(a) rejection of claims 35-39, 41-48, and 75 over Besser in view of Shan, Marieb, and Colgan.

The Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

sld/lS

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